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(54) A REMOTE WARNING ALARM DEVICE

(71) We, JEFFREY DAICH, of 27, Steeplestone Close, London, N.18, and MARTIN NEVILLE KEENE, of 54, Granville Place, High Road, London, N.12, and both of British Nationality, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to remote warning alarm devices. Such devices are particularly appropriate for vehicles and can also conveniently be used for domestic or business premises.

According to the present invention there is provided a remote warning alarm device comprising an RF transmitter, a portable receiver tuned to the transmitter frequency, an alarm signal device associated with said receiver, mating connection means on the transmitter and the receiver and trip means for triggering transmission of an alarm signal by the transmitter, the arrangement being such that in an inoperative state the receiver is connected to the transmitter by said connection means whose co-operation maintains the transmitter and receiver in a switched off condition, and such that in an operative state the receiver is disconnected from the transmitter, the lack of co-operation between said connection means maintaining the transmitter in a standby condition and the actuation of any said trip means causing the transmission of an alarm signal and the setting off of the alarm signal device at the receiver.

For a better understanding of the present invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawing, in which:

Figure 1 is a block diagram of the principal component parts of a remote warning alarm device, and

Figure 2 is a circuit diagram of the transmitter of Figure 1.

The device of Figure 1 has a transmitter 1 supplied from an electric power source 2. One or more trips 3 (two being shown in the drawing) are associated with the transmitter 1 and when actuated cause the latter to transmit a signal, in a manner to be described below. A local alarm 4 is also associated with the transmitter and gives its warning signal when any one of the trips 3 is actuated. A portable receiver 5 tuned to the transmitter frequency is provided and has a pin array 6 which mates with a corresponding socket 7 on the transmitter. The receiver 5 carries its own power supply (not shown) which is sufficient to actuate an alarm 8 attached thereto. The alarm 8 may give an audible, visual or tactile signal or a combination of those three.

Assuming that the device of Figure 1 is fitted to a motor vehicle, the power source 2 could be the vehicle's ordinary battery. However, it is better that the source 2 should be independent, re-chargeable batteries in case the vehicle's main electric power supply is interrupted or fails. The receiver's internal power supply is also preferably one or more batteries that can be trickle charged when the device is not in use.

When not in use the receiver 5 is plugged into the transmitter 1 and this maintains all circuits switched off. The arrangement of the pins 6 is coded to a particular socket 7 so that only one particular matching receiver can plug into and switch off a given transmitter, i.e. the pins 6 act as a key. The device is set in a "ready" or "standby" condition and interlocks are set when the driver leaves the vehicle, unplugging and taking with him the receiver 5. These interlocks may include means for breaking ignition and starter solenoid circuits or circuits with solenoids for actuating other devices. The

interlocks are set the instant the receiver is removed from its socket. One of the trips 3 may be associated with the driver's door so that when it opens, with the receiver removed from the transmitter, the latter is caused to set off the alarms. In order to allow the driver time to leave the vehicle, therefore, a time delay (not shown in Figure 1) is incorporated giving a period of fifteen or thirty seconds, for example, for the driver to leave the vehicle and shut the door without setting off the alarm 4. Trips 3 may be associated with all doors and windows, the lid of the boot and bonnet, the ignition and lighting systems and the petrol tank cap, for example. It will be understood that many other locations may be equipped with trips and the suitability of the device to buildings or equipment other than vehicles will be apparent. Should any trip 3 bet set off when the driver is away with the receiver 5 the transmitter 1 is caused to transmit a signal that is picked up by the receiver 5 and used to trigger the alarm 8, which may be an audible signal. Simultaneously, the output of the transmitter 1 can be used to immobilise the vehicle, by cutting out the ignition system, for example, and after a time delay to actuate the local alarm 4.

The range of the transmitter need not be great on the assumption that a driver with a valuable load would not go far from his parked vehicle but a minimum range of about one hundred yards is envisaged. The action a driver could take upon receiving an alarm need only be dialling 999. The time delay for the local alarm 4 also operates to allow a re-entry period for the driver after an uneventful absence. The alarm 8, however, is tripped thus testing that part of the device. During the re-entry period the driver would plug the receiver 5 into the transmitter 1 again, thus resetting the interlocks. For testing the alarm 4 the driver simply delays replacing the receiver beyond the time delay for the local alarm 4. The local alarm 4 may be the horn or lights being made to flash or both, for example. It is an optional feature since in some cases it may not be desired that an intruder should realise an alarm was being given by the transmitter 1.

The transmitted signal can also be used for tracing a vehicle, although the receiver 5 itself, being a small, portable unit of necessarily limited performance, would not be employed for this purpose. More sophisticated equipment, such as could be carried by police cars or security companies' vans, would be used and it would then only be necessary for the driver of a stolen vehicle to inform the police of the frequency and type of signal that the stolen vehicle would be transmitting.

In order to protect the transmitter itself the power source 2, which is within the transmitter's metallic casing (not shown), can be arranged to put a high but not lethal voltage between the transmitter casing and the chassis when the transmitter is in its standby condition.

In a modification of the device the transmitter is adpated to transmit, on standby, a continuously modulated signal when the situation is normal and to modify that signal if any one of the trips is activated. The receiver, assuming it has an alarm that produces a noise, may then emit a steady note to signify a normal situation and an interrupted or modulated note to signify an alarm. If the transmitter is destroyed the absence of any note at the receiver will also signify an alarm.

The receiver 5 will not be described in any detail since it is preferably of a standard superheterodyne type including an RF stage tuned to the transmitter frequency, a local crystal oscillator operating on a frequency of the transmitter crystal minus the IF frequency, a mixer, IF and AF stages and appropriate amplifiers. The alarm 8 is preferably a speaker at the output of the AF stage. However, the transmitter 1 will be described in more detail with reference to Figure 2. The actual circuit construction will be apparent from the Figure and its operation is as follows.

When the receiver is removed from the transmitter a pin of the array 6 breaks a connection between points V and O, relay RL_1 is thus de-energised and causes switch S to close, thereby energising relay RL_2 which bhreaks ignition and starter solenoid circuits and any other selected solenoid circuits in the vehicle. Capacitor C_1 starts to charge up through resistor R_3 until it reaches a potential of approximately 0.4 volts below the voltage level set by the voltage divider comprising resistors R3 and R5. Thereupon transistor T_1 starts to conduct and switches on transistor T_2, and the transsistor pair T_1 and T_2 avalanche and discharge capacitor C_1 through resistor R_4. This results in a pulse being applied to the gate of silicon controlled rectifier SCR_1, causing the latter to conduct and apply a voltage to the RF generator on the right hand side of broken line I—I'. A steady RF carrier wave is thus generated and transmitted from aerial A.

When a trip 3 is actuated a positive potential is applied to point P or a negative potential to point N, transistor T is made conductive and a pulse is applied to the gate of rectifier SCR_2, causing the latter to fire since rectifier SCR_1 is already conductive. Transistor T_3 is then switched on and in conjunction with transistor T_4 acts as a multivibrator turning transistor T_7 of the RF generator on and off, thus modulating

the transmitted RF signal. Also, after a time delay determined by resistor R_3 and capacitor C_4 transistors T_3 and T_4 avalanche and fire rectifier SCR_2. Relay RL_2 is energised and causes the local alarm 4 to be set off.

The details of operation of the RF generator will not be described since they will be apparent from the Figure, to the right of I—I', although all electrical elements have been referenced for identification.

When the receiver is replaced a pin of the array 6 shorts points V and O, thereby energising relay RL_1 which causes switch S to open, thereby resetting the whole circuit. In addition points V and Q are connected across a relay (not shown) in the receiver which switches the latter off. The points V and Q may also serve as the terminals used for charging the receiver's internal batteries.

When fitted to vehicles the normal ignition switch could be dispensed with and provision may be made, by means of spring contacts in the socket 7 for example, for the operation of the starter solenoid to be initiated by the plugging in of the receiver 5.

Although most of the preceding description has been concerned with vehicles, the device is equally applicable to business premises, in which case the transmitter is installed in those premises and the receiver is held by a security patrol or night watchman, for example.

WHAT WE CLAIM IS:—

1. A remote warning alarm device comprising an RF transmitter, a portable receiver tuned to the transmitter frequency, an alarm signal device associated with said receiver, mating connection means on the transmitter and the receiver and trip means for triggering transmission of an alarm signal by the transmitter, the arrangement being such that in an inoperative state the receiver is connected to the transmitter by said connection means whose co-operation maintains the transmitter and receiver in a switched off condition, and such that in an operative state the receiver is disconnected from the transmitter, the lack of co-operation between said connection means maintaining the transmitter in a standby condition and the actuation of any said trip means causing the transmission of an alarm signal and the setting off of the alarm signal device at the receiver.

2. A device as claimed in claim 1, and further comprising an alarm signal device associated with said transmitter, the triggering of the latter also setting off this alarm signal device.

3. A device as claimed in claim 2, wherein a time delay is incorporated in the transmitter whereby the setting off of the last-mentioned alarm signal device is made to occur later than the transmission of said alarm signal.

4. A device as claimed in any preceding claim, wherein said connection means comprise a plug with a pin array and a corresponding socket.

5. A device as claimed in any preceding claim, wherein the alarm signal device associated with the receiver is a sound emitting device.

6. A device as claimed in any preceding claim, wherein said transmitter transmits a continuous steady RF signal in said standby condition, said signal being modulated when any said trip means is actuated.

7. A device as claimed in any one of claims 1 to 5, wherein said transmitter transmits, in said standby condition, a signal that produces a steady output signal at the alarm signal device associated with the receiver, this steady output signal being modulated or ceasing when any said trip means is actuated or when the transmitter is damaged.

8. A device as claimed in any preceding claim, wherein said transmitter has a metallic casing and is mounted on a metallic body, such as a vehicle chassis, there being means within said casing for putting a voltage between said casing and said body when the transmitter is in its standby condition.

9. A remote warning alarm device substantially as hereinbefore described with reference to the accompanying drawing.

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1 SHEET This drawing is a reproduction of the Original on a reduced scale

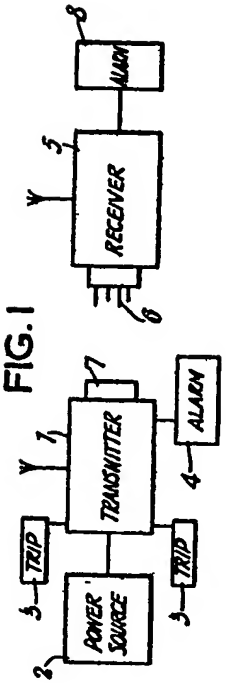

FIG. 1

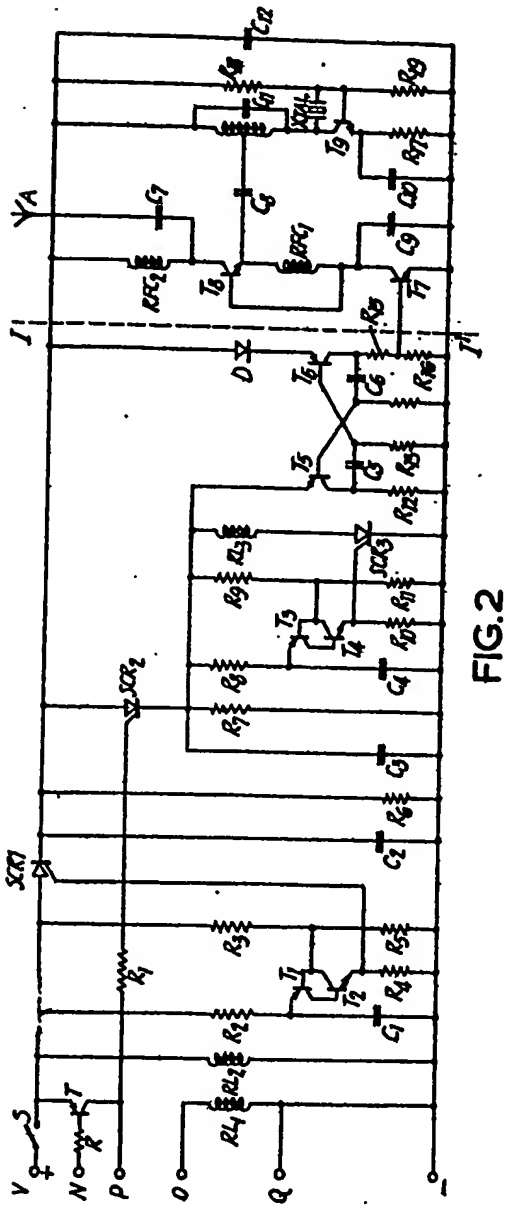

FIG. 2